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Varioseptispora chinensis gen. & sp. nov., *V. apicalis* nom. nov., *V. hodgkissii* comb. nov., and *V. versiseptatis* comb. nov.

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Abstract—*Varioseptispora chinensis,* a new genus and species, collected on decaying twigs of unidentified plants in Hainan, China, is described and illustrated. The genus is characterized by macronematous, unbranched, conidiophores with polytretic, integrated, terminal or intercalary conidiogenous cells that produce solitary, acropleurogenous distoseptate and euseptate, brown conidia. The illegitimate *Helminthosporium apicale* V. Rao & de Hoog is accommodated in *Varioseptispora* as the replacement name *V. apicalis*; and two *Spadicoides* spp. are accommodated as the new combinations *V. hodgkissii* and *V. versiseptatis*. A synoptic table and key to *Varioseptispora* species are provided.

Key words—asexual *Ascomycota*, hyphomycetes, saprobes, taxonomy

Introduction

While studying the saprophytic microfungi associated with plant debris in Hainan, China, an undescribed hyphomycete was discovered that is easily referable to *Helminthosporium* Link (Link 1809) and *Spadicoides* S. Hughes (Hughes 1958), except that its conidia are distoseptate and euseptate. Similarly, *Helminthosporium apicale* V. Rao & de Hoog, and *Spadicoides hodgkissii* and *S. versiseptatis* also have distoseptate and euseptate conidia (Rao &

de Hoog 1986, Ho & al. 2002, Wong & al. 2002). These four species are not in accordance with the *Helminthosporium* and *Spadicoides* generic concepts; therefore we propose a new genus and species *Varioseptispora chinensis* and a replacement name and two new combinations for the *Helminthosporium* and *Spadicoides* species.

Materials & methods

Samples of litter were placed in paper and plastic bags, taken to the laboratory, and prepared according to Castañeda-Ruiz & al. (2016). Mounts were prepared in PVL (polyvinyl alcohol and lactic acid) and measurements were made at a magnification of ×1000. Micrographs were obtained with a Nikon Eclipse 80i microscope equipped with bright field and Nomarski interference optics. The type specimen was deposited in the Herbarium of Jiangxi Agricultural University, Nanchang, Jiangxi, China (HJAUP).

Taxonomy

Varioseptispora L. Qiu, Jian Ma, R.F. Castañeda & X.G. Zhang, **gen. nov.**

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Differs from *Helminthosporium* and *Spadicoides* by its distoseptate and euseptate conidia.

Type species: *Varioseptispora chinensis* L. Qiu & al.

Etymology: *Vario-* (Latin) meaning variable + *septispora* (Latin) referring to the septate spores.

Conidiophores macronematous, mononematous, unbranched, erect, cylindrical, smooth, septate, brown to dark brown, with or without enteroblastic percurrent regenerations. Conidiogenous cells polytretic, integrated, terminal or intercalary, determinate, cylindrical, with several conspicuous pores. Conidial secession schizolytic. Conidia solitary, acropleurogenous, dry, clavate, obclavate or obovoid, distoseptate and euseptate, brown to pale brown, smooth.

Varioseptispora chinensis L. Qiu, Jian Ma, R.F. Castañeda & X.G. Zhang, **sp. nov.** Fig. 1

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Differs from *Helminthosporium* and *Spadicoides* spp. by its clavate conidia (3–)4–5 distoseptate with a basal euseptum.

Type: China, Hainan Province: Jianfengling Mountain, on decaying twigs of an unidentified broadleaf tree, 15 April 2014, J. Ma (**holotype**, HJAUP M0405).

Etymology: refers to the country in which the fungus was collected.

Colonies on natural substrate effuse, hairy dark brown. Mycelium partly superficial, partly immersed in the substrate, composed of branched, pale

Fig. 1. *Varioseptispora chinensis* (holotype, HJAUP M0405).
A, B. Conidiophores, conidiogenous cells, and conidia;
C. Conidiogenous cells, and conidia; D, E. Conidiophores; F. Conidia.

brown, septate, smooth-walled hyphae. Conidiophores macronematous, mononematous, unbranched, erect, straight or slightly flexuous, cylindrical, smooth, septate, brown to dark brown, 124–216 × 7.5–9.5 μm, with 1 enteroblastic percurrent regeneration. Conidiogenous cells polytretic, integrated, cylindrical, terminal, determinate, smooth, brown, 17–32.5 × 6.5–8 μm. Conidial secession schizolytic. Conidia solitary, acropleurogenous, dry, straight or slightly curved, clavate, apex rounded or with conical apex ending in a rounded papilla, base truncate, smooth-walled, reddish brown, (3–)4–5-distoseptate with 1-euseptate near the base, 30–38 × 11.5–14 μm, 3–4 μm wide at the truncate base.

Varioseptispora apicalis Z.H. Xu, Jian Ma, X.G. Zhang & R.F. Castañeda, **nom. nov.**
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≡ *Helminthosporium apicale* V. Rao & de Hoog, Stud. Mycol. 28: 70 (1986), nom. illeg. (non Berk. & Broome 1861).

Table 1 Synoptic comparisons of *Varioseptispora* species

Species	Conidiophores		Conidiogenous cells	Conidia				Substrate
	Regenerations	Size (µm)		Shape	Size (µm	Septa	Colour	
V. apicale	Yes	130–260 × 4–7	Terminal	Obclavate	28–38 × 7–9	1–2-euseptate above; 3-distoseptate below	Pale olivaceous brown; apical cell somewhat lighter	Rotten leaves
V. chinensis	Yes	124–216 × 7.5–9.5	Terminal	Clavate	30–38 × 11.5–14	3–5-distoseptate above; 1-euseptate below	Reddish brown	Decaying twigs
V. hodgkissii	No	60–120 × 3.5–4	Terminal & intercalary	Obovoid	9–13 × 5–8	0–1-euseptate below or both 1-euseptate below & 1-distoseptate above	Distal cells olivaceous brown: basal cells hyaline or very pale brown	Decaying wood baits
V. versiseptatis	No	90–125 × 3–3.5	Terminal & intercalary	Obovoid	13–14 × 5.5–6	2-euseptate below; 1-distoseptate above	Brown, paler at the base	Decaying culms

Varioseptispora hodgkissii (W.H. Ho, Yanna & K.D. Hyde) Z.H. Xu, Jian Ma, X.G. Zhang & R.F. Castañeda, **comb. nov.**

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≡ *Spadicoides hodgkissii* W.H. Ho, Yanna & K.D. Hyde, Mycologia 94(2): 302 (2002), [as '*hodgkissa*'].

Varioseptispora versiseptatis (M.K.M. Wong, Goh & K.D. Hyde) Z.H. Xu, Jian Ma, X.G. Zhang & R.F. Castañeda, **comb. nov.**

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≡ *Spadicoides versiseptatis* M.K.M. Wong, Goh & K.D. Hyde, Cryptog. Mycol. 23(3): 202 (2002).

Note: The characteristics of these four species are summarized in Table 1.

Key to *Varioseptispora* species

1. Conidia obovoid 2
1. Conidia clavate or obclavate 3
2. Conidia 9–13 × 5–8 µm, 0–1-euseptate or with both 1-euseptate below and 1-distoseptate above . . . . . *V. hodgkissii*
2. Conidia 13–14 × 5.5–6 µm, 2-euseptate below and 1-distoseptate above . . . . . *V. versiseptatis*
3. Conidia clavate, 30–38 × 11.5–14 µm, (3–)4–5-distoseptate above and 1-euseptate below . . . . . *V. chinensis*
3. Conidia obclavate, 28–38 × 7–9 µm, 1–2-euseptate above and 3-distoseptate below . . . . . *V. apicalis*

Discussion

Varioseptispora is characterized by its polytretic, integrated, terminal or intercalary conidiogenous cells on distinct, unbranched, conidiophores, and solitary, acropleurogenous, distoseptate and euseptate conidia. It has the same conidial ontogeny as *Spadicoides* and *Helminthosporium*, but conidia in *Spadicoides* are unicellular or multicellular, euseptate conidia (Hughes 1958, Ellis 1971, Sinclair & al. 1985, Goh & Hyde 1996, Seifert & al. 2011), conidia in *Helminthosporium* are distoseptate, and the conidiophores are with small pores at the apex and laterally beneath the septa (Link 1809, Shoemaker 1959, Ellis 1961, 1971, Siboe & al. 1999, Seifert & al. 2011). In several studies, conidial septation (eu- and distoseptate) has been used as the fundamental criterion for generic circumscription, thus providing a narrow generic concept, which can help avoid confusion and complexity in a number of hyphomycete genera (Subramanian 1992, Wu & Zhuang 2005, Seifert & al. 2011, Ma & al. 2016).

Varioseptispora has polytretic conidiogenesis and solitary conidia similar to several other genera including *Exosporium* Link, *Dendrographium* Massee, *Polytretophora* Mercado, *Weufia* Bhat & B. Sutton, *Porosubramaniania* Hol.-Jech., *Paliphora* Sivan. & B. Sutton, *Benjpalia* Subram. & Bhat, and *Bharatheeya* D'Souza & Bhat (Link 1809, Massee 1892, Mercado-Sierra 1983, Bhat & Sutton 1985, Holubová-Jechová 1985, Sivanesan & Sutton 1985, Subramanian & Bhat 1987, D'Souza & Bhat 2002). However, *Dendrographium* differs by its conidiophores forming synnematous conidiomata and distoseptate conidia; *Bharatheeya* differs by its setiform conidiophores and distoseptate conidia; *Paliphora* differs by its unicellular or multicellular, euseptate conidia; *Polytretophora* differs by its curved, 1-euseptate conidia with pigmented basal cell and hyaline apical cell. *Porosubramaniania*, *Benjpalia*, *Exosporium* and *Weufia* differ by their conidiogenous cells with cicatrized pores and conidia with only eusepta or distosepta.

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